

7. Home Energy Rating Systems (HERS) Required Verification and Diagnostic Testing

7.1. California Home Energy Rating Systems

Compliance credit for particular energy efficiency measures, which the Commission specifies, requires field verification and diagnostic testing of as-constructed dwelling units (as defined in Section 7.940) by a certified HERS (Home Energy Rating System) rater. The Commission approves HERS providers, subject to the Commission's HERS regulations, which is required to regulate home energy rating system (HERS) providers in California. These regulations appear in the California Code of Regulations, Title 20, Division 2, Chapter 4, Article 8, Sections 1670-1675. Approved HERS providers are authorized to certify HERS raters and maintain quality control over field verification and diagnostic testing ratings. Ratings are based on visual inspection and diagnostic testing of the physical characteristics and energy efficiency features of dwelling units, as constructed. When the term "dwelling unit" is used in reference to Home Energy Rating Systems (HERS) Required Verification and Diagnostic Testing applied to multifamily buildings, it shall mean each dwelling unit within each multifamily building project. When the term "building owner" is used in this Chapter, it shall mean owner of the dwelling unit.

When compliance documentation indicates field verification and diagnostic testing of specific energy efficiency measures as a condition for complying with Title 24, Part 6, an approved HERS provider and certified HERS rater shall be used to conduct the field verification and diagnostic testing. HERS providers and raters shall be considered special inspectors by building departments, and shall demonstrate competence, to the satisfaction of the building official, for the visual inspections and diagnostic testing. The HERS provider and rater shall be independent entities from the builder or subcontractor installer of the energy efficiency improvements being tested and verified, and shall have no financial interest in the installation of the improvements. Third Party Quality Control Programs approved by the Commission may serve the function of HERS raters for field verification purposes as specified in Section 7.67.

The remainder of this chapter describes the:

- Measures that require field verification or testing (including references to test procedures or protocols that shall be followed by installers and HERS raters);
- Required documentation and communication steps;
- ~~Required early notification of the HERS provider;~~
- Requirements for certification by the installer that the installation complies;
- Required HERS rater verification procedures, and sampling procedures to be used if the builder chooses to do sampling;
- Requirements for Third Party Quality Control Programs that are authorized to serve the function of HERS raters;
- Requirements for sampling when field verification and diagnostic testing is required for additions and alterations; and
- Responsibilities of each of the parties involved in the field verification and diagnostic testing process.

7.2. ~~Measures Required Field Verification and Diagnostic Testing~~ **HERS Required Verification and Diagnostic Testing**

~~HERS diagnostic testing and field verification is required for:~~

- ~~duct air sealing,~~
- ~~ACCA Manual D design and installation,~~
- ~~Refrigerant charge and airflow measurement, and~~
- ~~Building envelope sealing beyond improvements covered by default assumptions,~~

~~HERS field verification is required for:~~

- ~~thermostatic expansion valves,~~
- ~~duct surface area reductions, and~~
- ~~duct location improvements beyond those covered by default assumptions.~~

Table R7-1 describes the measures that require installer certification and HERS rater field verification and diagnostic testing, and identifies the protocol or test procedure in the appendices that shall be used for completing installer and HERS rater diagnostic testing and HERS rater field verification.

Table R7-1 – Summary of Measures Requiring Field Verification and Diagnostic Testing

<u>Measure Title</u>	<u>Description</u>	<u>Protocol or Test Procedure</u>
<u>Duct Measures</u>		
<u>Duct Sealing</u>	Package D requires that space conditioning ducts be sealed. If sealed and tested ducts are claimed in the proposed design ACM calculation, diagnostic testing is required to verify that leakage is less than the specified criteria.	<u>ACM RC-2005</u>
<u>Supply Duct Location, Surface Area and R-factor</u>	If compliance credit is claimed for improved supply duct location, surface area and R-value, field verification is required to verify that duct system was installed according to the design, including location, size and length of ducts, duct insulation R-value and installation of buried ducts. ¹	<u>ACM RC-2005</u>
<u>Air Conditioner Measures</u>		
<u>Improved Refrigerant Charge</u>	Package D requires in some climate zones that split system air conditioners and heat pumps be diagnostically tested in the field to verify that they have the correct refrigerant charge (see Section 4.7.3). The Proposed Design is modeled with less efficiency if diagnostic testing and field verification is not performed.	<u>ACM RD-2005</u>
<u>Installation of Thermostatic Expansion Valve (TXV)</u>	A TXV may be installed as an alternative to refrigerant charge testing. The existence of a TXV has the same calculated benefit as refrigerant charge testing and requires field verification.	<u>ACM RI-2005</u>
<u>Adequate Air Flow</u>	Air conditioner efficiency requires adequate airflow across the evaporator coil. Compliance credit may be taken when airflow is higher than the criteria specified	<u>ACM RE-2005</u>
<u>Air Handler Fan Watt Draw</u>	If compliance credit is taken for reductions in fan power, the installed fan power shall be diagnostically tested and verified in the field.	<u>ACM RE-2005</u>
<u>High Energy Efficiency Ratio (EER)</u>	Compliance credit may be taken for increases in EER by installation of specific air conditioner or heat pump models, but only if the installation of that high EER model is field verified.	<u>ACM RI-2005</u>
<u>Maximum Cooling Capacity</u>	An additional compliance credit may be taken when the requirements for the combination of adequate air flow, duct sealing and Improved refrigerant charge are met and air conditioners are sized according to the ACM calculations. Field verification is required.	<u>ACM RF-2005</u>
<u>Building Envelope Measures</u>		
<u>Building Envelope Sealing</u>	The default building envelope specific leakage area (SLA) is specified in Section 4.5.1. Compliance credit may be taken for improved building envelope sealing, but only if lower SLA values are field verified through diagnostic testing.	<u>ASTM E779-03</u>
<u>High Quality Insulation Installation</u>	ACMs recognize Standard and improved envelope construction. Compliance credit for improved envelope construction requires field verification.	<u>ACM RH-2005</u>

1. Note: Compliance credit for increased duct insulation R-value (not buried ducts) may be taken without field verification if the R-value is the same throughout the building, and for supply ducts located in crawlspaces and garages where all supply registers are either in the floor or within 2 feet of the floor. These two credits may be taken subject only to building department inspection.

2. Note: The requirement for verification of a high EER does not apply to equipment rated only with an EER.

All features that require verification and/or testing shall be listed in the *Field Verification And Diagnostic Testing* section of on the *Certificate of Compliance* (CF-1R). The listing shall include “eligibility and installation criteria” for such features. Field verified and diagnostically tested features shall be described in the *Compliance Supplement*. Installers shall certify that the requirements for compliance have been met on the *Installation Certificate* (CF-6R). Field Verification and diagnostic testing shall be performed by a HERS rater and documented on the *Certificate of Field Verification and Diagnostic Testing* (CF-6R).

7.3. These features shall be listed as *HERS Verification Required* features on the *Certificate of Compliance* (CF-1R) and the *Computer Method Summary* (C-2R). Such verification constitutes “eligibility and installation

criteria” for these features. Field verified and diagnostically tested features must be described in the *Compliance Supplement*.

7.3. Summary of Documentation and Communication

The documentation and communication process for measures that require field verification and diagnostic testing is summarized below. The subsequent sections of this chapter contain additional information.

- The documentation author shall complete the compliance documents, including the CF-1R. A CF-1R shall be prepared for each dwelling unit. For multi-family buildings a single CF-1R is typically prepared for a whole building, but separate compliance documentation shall be required for dwelling units that have measures requiring field verification and diagnostic testing.
- The documentation author shall provide a signed Certificate of Compliance (CF-1R) to the builder, which indicates that any HERS diagnostic testing and field verification measure is required for compliance. ~~the documentation author shall notify the HERS provider by phone, fax or email of the name of the builder, the street address or subdivision and lot number of the dwelling, and the measure(s) that require diagnostic testing and field verification. The documentation author shall certify on the CF-1R that this notification has been completed. The building department shall determine that this has taken place before accepting the CF-1R.~~ The builder shall make arrangements for the services of a certified HERS rater prior to installation of the measures, so that once the installation is complete the HERS rater has ample time to complete the field verification and diagnostic testing without delaying final approval of occupancy by the building department.
- The builder or subcontractor installs the measure(s) that require field verification and diagnostic testing. The builder or installer completes diagnostic testing and the procedures specified in Section 7.45. When the installation is complete, the builder or subcontractor completes the CF-6R (Installation Certificate), keeping it at the building site for review by the building department. A copy of the CF-6R is also provided to the HERS rater.
- The HERS rater shall complete the field verification and diagnostic testing as specified in Section 7.56, and provides signed CF-4Rs, Certificate of Field Verification and Diagnostic Testing, to the HERS provider, builder and building department. The building department shall not approve a dwelling unit for occupancy until the building department has received a CF-4R that has been signed by the certified HERS rater.

7.5.1 Builder

~~Builder employees or subcontractors responsible for completing either diagnostic testing, visual inspection or verification as specified in Section 7.3 shall certify the diagnostic testing results and that the work meets the requirements for compliance credit on the CF-6R.~~

~~The builder shall provide the HERS provider with the identifying location of the group of dwelling units to be included in the sample for field verification and diagnostic testing and the expected date that sampling may begin. The builder shall provide the HERS provider a copy of the CF-6R signed by the builder employees or subcontractors certifying that diagnostic testing and installation meet the requirements for compliance credit.~~

~~The builder shall provide a *Certificate of Field Verification and Diagnostic Testing* signed and dated by the HERS rater to the building official in conjunction with requests for final inspection for each dwelling unit.~~

~~When re-sampling reveals a failure, builders shall offer, at no charge to building owners in occupied dwelling units in the group, to complete field verification, testing and corrective action if necessary. Building owners may decline to have field verification and testing and corrective action completed. Builders shall report the identifying location of any dwelling unit in which the building owner declines field verification and testing and corrective action to the HERS provider. Builders shall take corrective action as required in all unoccupied dwelling units in the group and in occupied dwelling units in the group where building owners have accepted field verification, testing and corrective action.~~

7.5.2 HERS Provider and Rater

The HERS provider shall maintain a list of the dwelling units in the group from which sampling is drawn, the dwelling units selected for sampling, the dwelling units sampled and the results of the sampling, the dwelling units selected for re-sampling, the dwelling units that have been tested and verified as a result of re-sampling, the corrective action taken, and copies of all *Certificates of Field Verification and Diagnostic Testing* for a period of five years.

The HERS rater providing the diagnostic testing and verification shall sign and date a *Certificate of Field Verification and Diagnostic Testing* certifying that he/she has verified that the requirements for compliance credit have been met. *Certificates of Field Verification and Diagnostic Testing* shall be provided for the tested dwelling unit and each of up to six other dwelling units from the group for which compliance is verified based on the results of the sample. The HERS rater shall provide this certificate to the builder and the HERS provider.

The HERS Rater shall provide a separate *Certificate of Field Verification and Diagnostic Testing* for each dwelling unit the rater determines has met the diagnostic requirements for compliance. The HERS rater shall identify on the *Certificate of Field Verification and Diagnostic Testing* if the dwelling unit has been tested or if it was an untested dwelling unit approved as part of sample testing. The HERS rater shall not sign a *Certificate of Field Verification and Diagnostic Testing* for a dwelling unit that does not have a CF-6R signed by the installer as required in Sections 7.2 and 7.5.1.

If field verification and testing on a sampled dwelling unit identifies a failure to meet the requirements for compliance credit, the HERS rater shall report to the HERS provider and the builder that re-sampling will be required.

If re-sampling identifies another failure, the HERS rater shall report to the HERS provider and the builder that corrective action and diagnostic testing and field verification will be required for all the untested dwelling units in the group. This report shall specify the identifying location of all dwelling units that must be corrected and fully tested.

The HERS provider shall also report to the builder once diagnostic testing and field verification has shown that the failures have been corrected in all of the dwelling units except those for which the building owner has declined field verification, testing and corrective action.

When individual dwelling unit testing and verification confirms that the requirements for compliance have been met, the HERS rater shall provide a *Certificate of Field Verification and Diagnostic Testing* for each previously untested/unverified dwelling unit in the group and for each additional dwelling unit of the same model completed during the time required to correct, verify and test the previously untested/unverified dwelling units in the group.

The HERS provider shall file a report with the building department explaining all action taken (including field verification, testing, corrective actions, offers to building owners for testing and corrective action, and building owner declines of such offers) to bring into compliance dwelling units for which a signed and dated *Certificate of Field Verification and Diagnostic Testing* has been provided to the builder

7.5.3 Building Department

The building department at its discretion may require independent testing and field verification to in conjunction with the building department's required inspections, and/or observe the diagnostic testing and field verification performed by builder employees or subcontractors and the certified HERS rater in conjunction with the building department's required inspections to corroborate the results documented in installer certifications, and in the *Certificate of Field Verification and Diagnostic Testing*.

For dwelling units that have used a compliance alternative that requires field verification and diagnostic testing, the building department shall not approve a dwelling unit for occupancy until the building department has received from the builder a *Certificate of Field Verification and Diagnostic Testing* that has been signed and dated by the HERS rater.

If necessary to avoid delay of approval of dwelling units completed when outside temperatures are below 55°F, building departments may approve compliance credit for refrigerant charge and airflow measurement when

installers have used the alternate charging and airflow measurement procedure described in Appendix K, Section 3. This approval will be on the condition that installers provide a signed agreement (CF-6R) to the builder with a copy to the building department to return to correct refrigerant charge and airflow if the HERS rater determines at a later time when the outside temperature is above 55°F that correction is necessary.

7.4 HERS Provider Notification

~~When the documentation author provides a signed Certificate of Compliance (CF-1R) to the builder, which indicates that any HERS diagnostic testing and field verification measure is required for compliance, the documentation author shall notify the HERS provider by phone, FAX or email of the name of the builder, the street address or subdivision and lot number of the dwelling, and the measure(s) that require diagnostic testing and field verification. The documentation author shall certify on the CF-1R that this notification has been completed. The building department shall determine that this notification has taken place before accepting the CF-1R. The builder shall make arrangements for the services of a certified HERS rater prior to installation of the measures, so that once the installation is complete the HERS rater has ample time to complete the field verification and diagnostic testing without delaying final approval of occupancy by the building department.~~

7.5.4 Installer Requirements for Installation Certification (CF-6R) 7.3

Installation certificates (CF-6R) are required for each and every dwelling unit. When the installation of measures that require field verification and diagnostic testing is complete, the builder or the builder's subcontractor shall complete diagnostic testing and the procedures specified in this section. When the installation is complete, the builder or the builder's subcontractor shall complete the CF-6R (Installation Certificate), and keep it at the building site for review by the building department. The builder also shall provide a copy of the Installation Certificate to the HERS rater for any measures requiring field verification and diagnostic testing.

7.5.4.1 Measures Requiring Diagnostic Testing and Field Verification

When compliance includes duct sealing, ACCA Manual D design and installation, improved air conditioner refrigerant charge and airflow across the evaporator coil, reduced air conditioner fan power refrigerant charge and airflow measurement or building envelope sealing, builder employees or subcontractors shall:

- complete diagnostic testing, and
- certify on the CF-6R the diagnostic test results and that the work meets the requirements for compliance credit.

For refrigerant charge and airflow measurement when the outside temperature is below 55°F, the installer shall follow the alternate charge and airflow measurement procedure described in Appendix RD, Section RD3-Section RK3, ACM RD-2005 Appendix K, Section 3. Builder employees or subcontractors using these procedures shall certify on the CF-6R that they used these procedures, the diagnostic results, that the work meets the requirements for compliance credit, and that they will return to correct refrigerant charge and airflow if the HERS rater determines at a later time when the outside temperature is above 55°F that correction is necessary.

For duct sealing diagnostic testing completed at the rough-in stage of construction ~~construction using aerosol sealant closures,~~ builder employees or subcontractors shall:

- at rough-in, complete the fan pressurization test and certify on the CF-6R the diagnostic results,
- after installation of the interior finishing wall, ~~verify sealing of the ducts using either the house pressure test or the pressure pan test or by complete the installer visual inspection at final construction stage (See ACM RC-2005) of all duct connections (including duct to air handler connections), and~~
- certify on the CF-6R the diagnostic results and that the work meets the requirements for compliance credit.

7.5.27.4.2 Measures Requiring Field Verification

When compliance includes a thermostatic expansion valve, supply duct location, surface area and R-value improvements, duct surface area reductions and duct location improvements beyond those covered by default assumptions, installation of an air conditioner thermostatic expansion valve, high air conditioner EER, and high quality building envelope construction, builder employees or subcontractors shall:

- record the feature on the CF-6R,
- record on the CF-6R field measurements required to field verify the measure, and record on the CF-6R the duct surface area in each duct location, and
- certify on the CF-6R that the duct surface area and locations match those on the plans, and that the work meets the requirements for compliance credit.

— Installation certifications are required for each and every dwelling unit.

7.6.7.5 Verification and Sampling Procedures **7.4 HERS Verification**

At the builder's option HERS field verification and diagnostic testing shall be completed either for each dwelling unit or for a sample of dwelling units in which the measure requiring field verification and diagnostic testing is installed. Note that if multiple measures requiring field verification and diagnostic testing are installed in dwelling units, sample testing does not have to be completed for all of the measures in the same dwelling unit. Dwelling units in the sample shall be in the same subdivision or multifamily housing development. Field verification and diagnostic testing for compliance credit for duct sealing shall use the diagnostic duct leakage from fan pressurization of ducts in Section RC3.1, ACM RC-2005. Section 4.3.8.2.1 of Appendix F.

Field verification and diagnostic testing for compliance credit for refrigerant charge and airflow measurement shall use the standard charge and airflow measurement procedure specified in ACM RD-2005 Appendix K. Field verification and diagnostic testing shall not use the alternate charge and airflow measurement procedure. Field verification and diagnostic testing shall be scheduled and completed when the outside temperature is above 55°F.

The builder shall provide the HERS rater ~~provider~~ a copy of the CF-6R containing the installation certifications required in Section 7.4.7.5.3. Prior to completing field verification and diagnostic testing, the HERS rater shall first verify that the installation certifications have been completed.

If the builder chooses the sampling option, the procedures described in this section shall be followed. Sampling procedures described in this section shall be included in the Residential Manual Compliance Supplement.

7.6.17.5.17.4.1 Initial Field Verification and Testing

The HERS rater shall diagnostically test and field verify the first dwelling unit of each model. To be considered the same model, dwelling units shall be in the same subdivision or multifamily housing development and have the same energy designs and features, including the same floor area and volume, for each dwelling unit, as shown on the CF-1R. For multi-family buildings, variations in exterior surface areas caused by location of dwelling units within the building shall not cause dwelling units to be considered a different model. This initial testing allows the builder to identify and correct any potential construction flaws or practices in the build out of each model. If field verification and diagnostic testing determine that the requirements for compliance are met, the HERS rater shall provide a signed and dated *Certificate of Field Verification and Diagnostic Testing* (CF-4R) to the builder and the HERS provider, and the building department.

7.6.27.5.27.4.2 Sample Field Verification and Testing

After the initial testing is completed, the builder shall identify a group of up to seven dwelling units from which a sample will be selected for testing, and notify the HERS provider. The group shall include only dwelling units expected to be ready for diagnostic testing within a maximum 180-day period. If multiple measures requiring field verification and diagnostic testing are installed, each dwelling unit in the group shall have the same measures

requiring field verification and diagnostic testing as the other dwelling units in the group. If some dwelling units have installed a different set of measures requiring field verification and diagnostic testing, these dwelling units shall be in a separate group.

The builder shall identify the group of dwelling units by location of County, City and either the street address or the subdivision and lot number, or the multifamily housing project name and shall identify the names and license numbers of subcontractors responsible for ~~the duct installation, duct sealing, thermostatic expansion valve installation, refrigerant charge and airflow measurement or envelope sealing that installations requiring~~ diagnostic testing or field verification. The builder may ~~add additional~~ remove dwelling units ~~to from~~ the group by notifying the HERS provider ~~as long as they are completed within the maximum 180-day period. Removed dwelling units which are constructed shall either be field verified and diagnostically tested individually or shall be included in a subsequent group for sampling.~~

The HERS rater shall select a minimum of one dwelling unit out of ~~every seven sequentially completed dwelling units from the group, rounded up to the next whole number,~~ for diagnostic testing and field verification ~~as described in Section 7.4.~~ When several dwelling units are ready for testing at the same time, the HERS rater shall randomly select the dwelling units to be tested. The HERS rater shall diagnostically test and field verify the dwelling units selected by the HERS rater.

If field verification and diagnostic testing determines that the requirements for compliance are met, the HERS rater shall provide a signed and dated *Certificate of Field Verification and Diagnostic Testing* to the builder, ~~and the HERS provider, and the building department.~~ The *Certificate of Field Verification and Diagnostic Testing* shall report the successful diagnostic testing results and conclusions regarding compliance for the tested dwelling unit.

The HERS rater shall also provide a signed and dated *Certificate of Field Verification and Diagnostic Testing* to the builder and the HERS provider for up to six additional dwelling units ~~from in~~ the group. The *Certificate* shall not be provided for dwelling units in which the feature requiring field verification and diagnostic testing has not been installed, sealed or completed.

~~The maximum 180-day period shall begin on the date of the first *Certificate of Field Verification and Diagnostic Testing* for the group and shall end either with the date of the last verified test from the group or 180 days, whichever is less. Once all homes in the group have been certified, the 180 day clock is reset. Dwelling units within the group for which a *Certificate of Field Verification and Diagnostic Testing* has not been completed within 180 days from the date of the first *Certificate of Field Verification and Diagnostic Testing* for the group, as determined by the HERS provider, shall either be individually tested or be included in a group of dwelling units in a subsequent sample period.~~

Whenever the builder changes subcontractors who are responsible for the feature that is being diagnostically field verified and tested, the builder shall notify the HERS rater of any subcontractors who have changed, and terminate sampling for the identified group. All dwelling units using *HERS Required Verification* features for compliance that were installed by previous subcontractors or were subject to verification and testing under the supervision of a previous HERS provider, for which the builder does not have a completed *Certificate of Field Verification and Diagnostic Testing*, shall either be individually tested or included in a separate group for sampling. Dwelling units with installations completed by new subcontractors shall either be individually tested or shall be included in a new sampling group following a new *Initial Field Verification and Testing*.

The HERS rater shall not notify the builder when sample testing will occur prior to the completion of the work that is to be tested. After the HERS rater notifies the builder when testing will occur, the builder shall not do additional work on the features being tested.

7.6.37.5.37.4.3 Re-sampling, Full Testing and Corrective Action,

When a failure is encountered during sample testing, the HERS rater shall conduct re-sampling to assess whether that failure is unique or the rest of the dwelling units are likely to have similar failings. The HERS ~~provider~~ rater shall select for re-sampling one ~~out of every seven of all of the~~ up to six untested dwelling units in the group, ~~rounded up to the next whole number.~~

If testing in all dwelling units in the re-sample confirms that the requirements for compliance credit are met, then the dwelling unit with the failure shall not be considered an indication of failure in the other dwelling units in the group. The HERS rater shall provide a signed and dated Certificate of Field Verification and Diagnostic Testing to the builder, the HERS provider, and the building department for up to six additional dwelling units in the group, including the dwelling unit in the re-sample. The builder shall take corrective action for the dwelling unit with the failure, and then the HERS rater shall retest to verify compliance and issue a signed and dated Certificate of Field Verification and Diagnostic Testing to the builder. ~~Sampling shall then resume for the remainder of the group.~~

If field verification and testing in any of the dwelling units in the re-sample results in a second failure, the builder shall take corrective action in all unoccupied dwelling units in the group that have not been tested ~~but for which a Certificate of Field Verification and Diagnostic Testing has been completed.~~ In cases where corrective action would require destruction of building components, the builder may choose to reanalyze compliance and choose different measures that will achieve compliance. In this case a new Certificate of Compliance shall be completed and submitted to the HERS provider, HERS rater and building department. When a builder chooses to take corrective action, the HERS rater shall conduct field verification and diagnostic testing in each of these dwelling units to verify that problems have been corrected and that the requirements for compliance have been met, and shall report to the HERS provider, the builder, and the building department.

Builders shall offer at no charge to building owners⁴ (for a definition of "building owner" and of other terms used in this chapter, see Section 7.949) in occupied dwelling units in the group to complete field verification and testing and corrective action if necessary. ~~Building owners may decline this offer.~~ Builders shall report to the HERS provider the identifying location of any dwelling unit in which the building owner declines field verification and testing and corrective action to the HERS provider. The HERS provider shall verify that the builder has made this offer. If a building owner in an occupied dwelling unit declines this offer, field verification, testing and corrective action will not be required for that dwelling unit and the dwelling unit will no longer be considered a part of the group. If a building owner accepts this offer, the builder shall take corrective action. The HERS rater shall then conduct field verification and diagnostic testing to verify that problems have been corrected and that the requirements for compliance have been met, and shall report to the HERS provider, builder, and the building department.

The HERS provider shall file a report with the building department explaining all action taken (including field verification, testing, corrective action, offers to building owners for testing and corrective action and building owner declines of such offers) to bring into compliance dwelling units for which full testing has been required ~~a signed and dated Certificate of Field Verification and Diagnostic Testing has been provided to the builder.~~ If corrective action requires work not specifically exempted by Section 112 of the UMC-CMC or Section 106 of the UBCCBC, the builder shall obtain a permit from the building department prior to commencement of any of the work.

~~Until corrections, field verification and testing of all dwelling units in the group have been completed or building owners in occupied dwelling units have declined corrective action, sampling of additional dwelling units in the group shall cease.~~ If additional dwelling units in the group are completed during the time required to correct, field verify and test the previously completed dwelling units in the group, the rater shall individually field verify and diagnostically test those additional dwelling units to confirm that the requirements for compliance credit are met. ~~Once corrections, field verification and testing is completed for all dwelling units that have a Certificate of Field Verification and Diagnostic Testing, excepting those where building owners have declined corrective action, the builder shall either resume sampling for the remainder of the dwelling units in the group or terminate the group.~~

Corrections shall not be made to a sampled or re-sampled dwelling unit to avoid a failure. If corrections are made to a sampled or re-sampled dwelling unit to avoid failure, corrections, field verification and testing shall be performed on 100% of the dwelling units in the group.

⁴ ~~When the term "building owner" is used in this Chapter, it shall mean owner of the dwelling unit.~~

7.7.6 Third Party Quality Control Programs

The Commission may approve Third Party Quality Control Programs that serve the function of HERS raters for field verification purposes. Third Party Quality Control Programs shall provide training to installers regarding compliance requirements for measures for which diagnostic testing and field verification is required. Third Party Quality Control Programs shall collect data from participating installers for each installation completed for compliance credit, complete data checking analysis to evaluate the validity and accuracy of the data to independently determine whether compliance has been achieved, provide direction to the installer to retest and correct problems when data checking determines that compliance has not been achieved, require resubmission of data when retesting and correction is directed, and maintain a database of all data submitted by installers in a format that is acceptable to the Commission and available to the Commission upon request. The data that is collected by the Third Party Quality Control Program shall be more detailed than the data required for showing compliance with the Standards, shall provide an independent check on the validity and accuracy of the installer's claim that compliance has been achieved, and shall not be alterable by the installer to indicate that compliance has been achieved when in fact compliance has not been achieved.

The Third Party Quality Control Program shall also obtain the services of a HERS rater to conduct independent field verifications, completing all of the responsibilities of a HERS rater as specified in this Chapter with the exception that sampling shall be completed for a group of up to thirty dwelling units with a minimum sample of one out of every thirty sequentially completed dwelling units from the group. The HERS rater shall be an independent entity from the Third Party Quality Control Program. Re-sampling, Full Testing and Corrective Action shall be completed as specified in section 7.56.3 with the exception that re-sampling shall be completed for a minimum of one out of every thirty dwelling units from the group.

The Third Party Quality Control Program shall meet all of the requirements of a HERS rater specified in the Commission's HERS Program regulations (California Code of Regulations, Title 20, Division 2, Chapter 4, Article 8, Sections 1670 -1675), including the requirement to be an independent entity from the builder and the HERS rater that provides independent field verifications, subcontractor installer as specified by section 1673(i). A Third Party Quality Control Program may have business relationships with installers participating in the Program to advocate or promote the Program and an installer's participation in the Program, and to advocate or promote products that the Third Party Quality Control Program sells to installers as part of the Program.

Prior to approval by the Commission, the Third Party Quality Control Program shall provide a detailed explanation to the Commission of 1) the data that is to be collected from the installers, 2) the data checking process that will be used to evaluate the validity and accuracy of the data, 3) the justification for why this data checking process will provide strong assurance that the installation actually complies, and 4) the format for the database that will be maintained and provided to the Commission upon request. The Third Party Quality Control Program may apply for a confidential designation of this information as specified in the Commission's Administrative Regulations (California Code of Regulations, Title 20, Division 2, Chapter 7, Article 2, Section 2505). The Third Party Quality Control Program shall also provide a detailed explanation of the training that will be provided to installers, and the procedures that it will follow to complete independent field verifications.

The Third Party Quality Control Program shall be considered for approval as part of the rating system of a HERS Provider, which is certified as specified in the Commission's HERS Program regulations, Section 1674. A Third Party Quality Control Program can be added to the rating system through the recertification of a certified HERS Provider as specified by Section 1674(d).

7.7.7 Sampling for Additions or Alterations

When compliance for an addition or alteration requires diagnostic testing and field verification, the building owner may choose for the testing and field verification to be completed for the dwelling unit alone or as part of a sample of dwelling units for which the same installing company has completed work that requires testing and field verification for compliance. The building owner or agent of the building owner shall complete the applicable portions of a Certificate of Compliance (CF-1R) and shall complete the HERS Provider Notification as specified in section 7.4. The HERS provider shall define the group for sampling purposes as all dwelling units where the building permit applicant has chosen to have testing and field verification completed as part of a sample for the

same installing company. The group shall be no larger than seven. The installing company may request a smaller group for sampling. Whenever the HERS rater for the group is changed, a new group will be established. Initial Field Verification and Testing shall be completed for the first dwelling unit in each group. Re-sampling, Full Testing and Corrective Action shall be completed if necessary as specified by section 7.56.3.

Field verification may be completed by an approved Third Party Quality Control Program as specified in section 7.67. The group for sampling purposes shall be no larger than thirty when a Third Party Quality Control Program is used. The Third Party Quality Control Program may define the group instead of the Provider. When a Third Party Quality Control Program is used, the CF-6R shall document that data checking has indicated that the dwelling unit complies. The building official may approve compliance based on the CF-6R on the condition that if sampling indicates that re-sampling, full testing and corrective action is necessary, such work shall be completed.

7.97.8 Summary of Responsibilities

This section summarizes responsibilities described previously in this chapter and organizes them by the responsible party.

7.9.1 Certificate of Compliance Documentation Author

~~When the Certificate of Compliance (CF-1R) indicates that any HERS field verification and diagnostic testing measure is required for compliance, the documentation author shall notify the HERS provider by phone, FAX or email and send a copy of the CF-1R to the HERS provider. The documentation author shall certify on the CF-1R that this notification has been completed.~~

7.9.17.8.1 Builder

The builder shall make arrangements for the services of a certified HERS rater prior to installation of the measures, so that once the installation is complete the HERS rater has ample time to complete the field verification and diagnostic testing without delaying final approval of occupancy by the building department.

Builder employees or subcontractors responsible for completing either diagnostic testing, visual inspection or verification as specified in Section 7.45 shall certify the diagnostic testing results and that the work meets the requirements for compliance credit on the CF-6R.

The builder shall provide the HERS ~~rater provider~~ with the identifying location of the group of dwelling units to be included in the sample for field verification and diagnostic testing. The builder shall provide the HERS provider a copy of the CF-6R signed by the builder employees or sub-contractors certifying that diagnostic testing and installation meet the requirements for compliance credit.

The builder shall provide a *Certificate of Field Verification and Diagnostic Testing* (CF-4R) signed and dated by the HERS rater to the building official in conjunction with requests for final inspection for each dwelling unit.

When re-sampling reveals a failure, builders shall offer, at no charge to building owners in occupied dwelling units in the group, to complete field verification, testing and corrective action if necessary. Building owners may decline to have field verification and testing and corrective action completed. Builders shall report the identifying location of any dwelling unit in which the building owner declines field verification and testing and corrective action to the HERS provider. Builders shall take corrective action as required in all unoccupied dwelling units in the group and in occupied dwelling units in the group where building owners have accepted field verification, testing and corrective action.

7.9.27.8.2 HERS Provider and Rater

The HERS provider shall maintain a list of the dwelling units in the group from which sampling is drawn, the dwelling units selected for sampling, the dwelling units sampled and the results of the sampling, the dwelling units selected for re-sampling, the dwelling units that have been tested and verified as a result of re-sampling, the

corrective action taken, and copies of all *Certificates of Field Verification and Diagnostic Testing* for a period of five years.

The HERS rater providing the diagnostic testing and verification shall sign and date a *Certificate of Field Verification and Diagnostic Testing* certifying that he/she has verified that the requirements for compliance credit have been met. *Certificates of Field Verification and Diagnostic Testing* shall be provided for the tested dwelling unit and each of up to six other dwelling units from the group for which compliance is verified based on the results of the sample. The HERS rater shall provide this certificate to the builder, the HERS provider, and the building department.

The HERS rater shall provide a separate *Certificate of Field Verification and Diagnostic Testing* for each dwelling unit the rater determines has met the diagnostic requirements for compliance. The HERS rater shall identify on the *Certificate of Field Verification and Diagnostic Testing* if the dwelling unit has been tested or if it was an untested dwelling unit approved as part of sample testing. The HERS rater shall not sign a *Certificate of Field Verification and Diagnostic Testing* for a dwelling unit that does not have a CF-6R signed by the installer as required in Section 7.45.

If field verification and testing on a sampled dwelling unit identifies a failure to meet the requirements for compliance credit, the HERS rater shall report to the HERS provider, the builder, and the building department that re-sampling will be required.

If re-sampling identifies another failure, the HERS rater shall report to the HERS provider, the builder, and the building department that corrective action and diagnostic testing and field verification will be required for all the untested dwelling units in the group. This report shall specify the identifying location of all dwelling units that shall be fully tested and corrected.

The HERS provider shall also report to the builder once diagnostic testing and field verification has shown that the failures have been corrected in all of the dwelling units except those for which the building owner has declined field verification, testing and corrective action.

When individual dwelling unit testing and verification confirms that the requirements for compliance have been met, the HERS rater shall provide a *Certificate of Field Verification and Diagnostic Testing* for each dwelling unit in the group.

The HERS provider shall file a report with the building department explaining all action taken (including field verification, testing, corrective actions, offers to building owners for testing and corrective action, and building owner declines of such offers) to bring into compliance dwelling units for which full testing has been required.

7.9.37.8.3 Third Party Quality Control Program

An approved Third Party Quality Control Program shall:

- Provide training to installers regarding compliance requirements for measures for which diagnostic testing and field verification is required.
- Collect data from participating installers for each installation completed for compliance credit.
- Complete data checking analysis to evaluate the validity and accuracy of the data to independently determine whether compliance has been achieved.
- Provide direction to the installer to retest and correct problems when data checking determines that compliance has not been achieved.
- Require resubmission of data when retesting and correction is directed, and
- Maintain a database of all data submitted in a format that is acceptable to the Commission and available to the Commission upon request.

The Third Party Quality Control Program shall obtain the services of an independent HERS rater to conduct independent field verifications, completing all of the responsibilities of a HERS rater as specified in this Chapter with the exception that sampling shall be completed for a group of up to thirty dwelling units and sampling and re-

sampling shall be completed for a minimum of one out of every thirty sequentially completed dwelling units from the group.

7.9.47.8.4 Building Department

~~When the Certificate of Compliance (CF-1R) indicates any HERS diagnostic testing and field verification measure is required for compliance, the building department shall verify that the Documentation Author has notified the HERS Provider before accepting the CF-1R.~~

The building department at its discretion may require independent testing and field verification to be scheduled so that it can be completed in conjunction with the building department's required inspections, and/or observe the diagnostic testing and field verification performed by builder employees or subcontractors and the certified HERS rater in conjunction with the building department's required inspections to corroborate the results documented in installer certifications, and in the *Certificate of Field Verification and Diagnostic Testing*.

For dwelling units that have used a compliance alternative that requires field verification and diagnostic testing, the building department shall not approve a dwelling unit for occupancy until the building department has received a *Certificate of Field Verification and Diagnostic Testing* that has been signed and dated by the HERS rater.

If necessary to avoid delay of approval of dwelling units completed when outside temperatures are below 55°F, building departments may approve compliance credit for refrigerant charge and airflow measurement when installers have used the alternate charging and airflow measurement procedure described in ACM RD-2005, Section RD3. This approval will be on the condition that installers provide a signed agreement to the builder with a copy to the building department to return to correct refrigerant charge and airflow if the HERS rater determines at a later time when the outside temperature is above 55°F that correction is necessary.

7.107.9 Definitions of Terms Used In This Chapter

The following definitions apply to the procedures described in this document.

Building Owner means the owner of the dwelling unit.

Builder means the general contractor responsible for construction.

Building Department means the city, county or state agency responsible for approving the plans, issuing a building permit and approving occupancy of the dwelling unit.

Dwelling Unit means the building for single-family residences or each dwelling unit within a multifamily building project.

HERS Provider means an organization that the Commission has approved to administer a home energy rating system program, certify raters and maintain quality control over field verification and diagnostic testing required for compliance with the Energy Efficiency Standards.

HERS Rater means a person certified by a Commission approved HERS Provider to perform the field verification and diagnostic testing required for demonstrating compliance with the standards.

Independent Entity means having no financial interest in, and not advocating or recommending the use of any product or service as a means of gaining increased business with, firms or persons specified in Section 1673(i) of the California Home Energy Rating System Program regulations (California Code of Regulations, Title 20, Division 2, Chapter 4, Article 8). **Financial Interest** means an ownership interest, debt agreement, or employer/employee relationship. Financial interest does not include ownership of less than 5% of the outstanding equity securities of a publicly traded corporation.

NOTE: The definitions of "independent entity" and "financial interest," together with Section 1673(i), prohibit conflicts of interest between providers and raters, or between providers/raters and builders/subcontractors.

Documentation Author means the person responsible for completing the compliance documentation that demonstrates whether a building complies with the standards. Compliance documentation requirements are defined in the Residential Manual.

Model means a floor plan and house design that is repeated throughout a subdivision or within a multi-family building. To be considered the same model, dwelling units shall be in the same subdivision or multi-family housing development and have the same energy designs and features, including the same floor area and volume, for each dwelling unit, as shown on the CF-1R. For multi-family buildings, variations in exterior surface areas caused by location within the building shall not cause dwelling units to be considered a different model.

Certificate of Field Verification and Diagnostic Testing (CF-4R) means a document with information required by the Commission that is prepared by the HERS rater to certify that measures requiring field verification and diagnostic testing comply with the requirements.

Certificate of Compliance (CF-1R) means a document with information required by the Commission that is prepared by the Documentation Author that indicates whether the building includes measures that require field verification and diagnostic testing.

Installation Certificate (CF-6R) means a document with information required by the Commission that is prepared by the builder or installer verifying that the measure was installed to meet the requirements of the standards.